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ABSTRACT

Presented is an annotated bibliography of "appropriate technology" (AT) publications. The bibliography is divided into the following sections. Philosophy and overview section includes works describing the interrelationship of technology with other facets of development; place of technology in international relations; criteria for "appropriate," "intermediate," or "alternative" technologies; sources of the AT movement; and impact of technology on individual lives. Specific Appropriate Technology Techniques section gives descriptions of techniques/information on how devices are constructed, used, and/or maintained. This section is divided into four subsections addressing: (1) general techniques, covering compilations of various AT techniques; (2) agriculture and food, ranging from descriptions of farming devices/techniques to food processing, preservation, and storage; (3) composite techniques, focusing on AT applications in communication, energy, health; and (4) water supply/sanitation techniques, including technical/non-technical descriptions of the design/construction of many types of water supply and sanitary facilities at community-wide and household levels. Continuing Sources of Information are provided in the next section. These include both publications (newsletters, journals, directories) and organizations focusing on appropriate technology. Each entry includes complete title, author(s), source, and annotation. Listed in the final section are 15 documents without annotations. Definitions for and explanations of AT are provided in the introduction to the bibliography. (JN)

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ANNOTATED BIBLIOGRAPHY #8

Appropriate Technology--A Selected, Annotated Bibliography

Prepared by
Carolyn Andree
and the staff of the
Non-Formal Education Information Center

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FOREWORD

Through its series of Annotated Bibliographies, the Non-Formal Education Information Center seeks to facilitate the sharing of materials among those actively engaged in non-formal education for development. The field of non-formal education is being built not only by a diverse transnational network of researchers and practitioners, but also by persons who are themselves the beneficiaries of non-formal education. For this reason, relevant literature is burgeoning from a variety of sources often eluding those most eager to access it.

The Non-Formal Education Information Center has always tried to be user-oriented, a policy which has caused us to depart slightly from our usual practice of focusing our bibliographies on particular target groups, basic needs, or NFE methods. Because of an increasing number of requests on the topic of appropriate technology, in this bibliography we have decided to address the content of what is taught. Work around the world suggests that "appropriate technology" can be defined in a number of ways. We have elected to use five criteria that are described in the introduction. We recognize, and have struggled with, some of the difficulties that result from our choice but believe that by doing so we are still able to represent the range of concerns, issues, approaches, and activities that exist within the international NFE network.

This bibliography describes materials selected from the NFE resource collection and is the eighth in our series of annotated bibliographies.

Titles in our bibliography series are, to date:

No. 1 Women in Development

No. 2 Non-Formal Education and Health

No. 3 Literacy and Basic Education

No. 4 Projects, Training, and Strategies for Generating Income

No. 5 Managing Development Projects

No. 6 Children: Health, Education, and Change

No. 7 Non-Formal Education and the Handicapped in Developing Countries

No. 8 Appropriate Technology

No. 9 Nutrition and Food--Education, Policy, and Practice

The reader of our bibliography series will notice that some publications and resources are annotated in more than one bibliography. This reflects the topical complexity of the field of non-formal education as well as the extent to which subareas of the field have become integrated to deal with the issues and problems confronted.

The materials included in this bibliography have been brought to our attention by persons in the worldwide NFE network, thus giving a sense of the ways in which many are addressing this important area. Because of the "fugitive" nature of many of the

materials, we have included full information on document sources to assist readers in acquiring items of interest.

Though several staff members have made important contributions to this bibliography special acknowledgment is due to Lela Vandenberg for her valuable input in the conceptualization, writing, and editing stages of the publication. We also wish to single out Milla McLachlan and Karen Collamore Sullivan for their excellent annotations. In recognition of others who have contributed to this publication the last page lists individuals who have served on the Center staff between 1976 and 1982.

We welcome suggestions from our readers and invite new contributions related to this emerging area of interest.

Mary Joy Pigozzi
Director
Non-Formal Education Information Center

INTRODUCTION

Previous annotated bibliographies published by the Non-Formal Education Information Center have dealt with the recipients, the social impact, or the methods of non-formal education. This bibliography on appropriate technology concentrates on a different facet of that education, the content of what is taught. The publications chosen for annotation are some of the many examples drawn from publications contributed by participants of the NFE network to the NFE Information Center library, and are not intended to cover all of the variations of appropriate technology. They were chosen for the bibliography because they indicate the range of AT applications and because we hope they will stimulate further innovation on the part of readers or their students.

"Appropriate technology" (AT) has become almost a catchword. Its widespread use is due as much to the large number of different definitions of the term as it is to a general acceptance of any one definition. After all, most people perceive their own ideas about technology as being appropriate. In the literature, the term "appropriate technology" sometimes refers to highly advanced technologies, sometimes to traditional or modified versions of traditional technologies, and, at other times, to any labor-intensive and low-capital technologies. One theme seems common to most of the definitions; that is, that the technology should fit the culture where it is used. Again, however, definitions of cultural "fit" are widely varied. Whatever the philosophical position behind the definition, there does seem to be a growing awareness that technology and culture are interrelated.

The definition most widely used in the literature covered in this bibliography incorporates several criteria of appropriateness. The first is the maximizing of employment opportunities for the people using or affected by the technology without excessively sacrificing efficiency of production. Second is the maximizing of the self-reliance of those same people by the choice of technological hardware which they can understand, use, and maintain with local skills and materials. Third, capital expenditures for purchase, use and maintenance of equipment should be held to a minimum. Fourth, whenever possible, the technology should utilize renewable resources and avoid environmental damage. And finally, the technology should foster initiative toward development among the local people; hence, some degree of "bottom up" decisionmaking is implied.

To a lesser degree, the terms "intermediate technology" and "alternative technology" have some of the same variation in definition as "appropriate technology" and are sometimes used interchangeably. Literature on intermediate or alternative technologies is included in this bibliography when the terms more or less fit the criteria described above. "Traditional technology" may also meet those same criteria; several examples of traditional technology are

included among the annotations. In some instances publications discussing "appropriate," "intermediate," or "alternative" technologies which do not fully meet the criteria above have been included because they may still offer AT information of much explicit value.

Although most of the entries in this bibliography focus on the physical artifacts, or tools, that are part of technology, the definition of "technology" used here also includes the skills, knowledge, and techniques necessary to create, use, and maintain those tools. For example, "technology" may imply not only a particular type of plow, but also the ability to design, make, use, and/or repair it. Several of the entries reflect the latter part of the definition.

Much of the literature directly states or implies that technology is not isolated from environmental, economic, political, social, and cultural structures, including work patterns and the division of labor. Several of the annotations reflect contemporary concerns for the differential impact of technology on community members, especially how the impact can differ for men and women.

The bibliography is divided into the following sections.

1.0 Philosophy and Overview. Includes works describing the interrelationship of technology with other facets of development; the place of technology in international relations; criteria for "appropriate," "intermediate," or "alternative" technologies; sources of the AT movement; and the impact of technology on individual lives.

2.0 Specific Appropriate Technology Techniques. Gives descriptions of techniques or information on how devices are constructed, used, and/or maintained. Examples of some AT tools and techniques are given here, chosen to represent those which occur most frequently in the literature, appear to represent new trends in AT thinking, or seem to have an especially high potential for meeting human needs. These are divided into the following subsections:

2.1 General. Covers compilations of a variety of AT techniques, often combined with an introductory section that is broader and more philosophical in scope.

2.2 Agriculture and Food. Ranges from descriptions of farming devices and techniques to food processing, preservation, and storage.

2.3 Composite. Includes AT applications in communication, energy, and health. The references related to communication incorporate information on materials designed for use in more traditional educational contexts, as well as mass communication techniques. Those on energy deal with biogas, direct and indirect solar energy sources, geothermal energy, and wind, draught animal, and pedal power. And the references related to health include health care equipment, medicines, and preventive measures.

2.4 Water Supply and Sanitation. Covers technical and non-technical descriptions of the design and construction of many types of water supply and sanitary facilities, both at the community-wide and household levels.

3.0 Continuing Sources of Information. Describes ways of gaining up-to-date information or exchanging ideas between people working in the field.

3.1 Newsletters, Journals, and Directories. Lists publications specifically about or which frequently include articles or sections on appropriate technology, as well as directories of organizations involved in AT work.

3.2 Organizations. Lists some of the organizations which focus on or include appropriate technology as one of their primary concerns, according to the definition given previously. The organizations included have come to our attention through their publications or descriptions of their work in the literature.

4.0 Recent Acquisitions. Cites publications which were received at the NFE Information Center during the final stages of preparation of this bibliography.

--Carolyn Andree

1.0 PHILOSOPHY AND OVERVIEW

Bell, Gwen (ed.). Strategies for Human Settlements: Habitat and Environment. 1976. East-West Technology and Development Institute, The University Press of Hawaii, Honolulu, Hawaii 96822, USA.

This collection of essays by writers such as R. Buckminster Fuller and E. F. Schumacher addresses itself to the critical problem that humankind faces of living on a planet containing finite amounts of resources and an ever-expanding mass of humanity. The contributors offer innovative and specific ideas for coping efficiently, and explore the diverse fields of housing and improved building technologies, integrated food production, waste disposal, conservation, and transportation. Examples are drawn from both industrialized and developing nations. Of primary interest to planners, policymakers, public officials, and academicians. 172 pp.

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Carr, Marilyn. Appropriate Technology for African Women. 1978. Available from the African Training and Research Centre for Women, United Nations Economic Commission for Africa, P.O. Box 3001, Addis Ababa, Ethiopia

A discussion of appropriate and available technology as it relates to current concerns about women in development. The document is divided into three chapters: the first considers the need, relevance, and application of appropriate technology in Africa; the second looks at the role of African women in the development process and attempts to show the importance of introducing improved technologies; the third describes some of the village-level technologies that are currently available and reviews the activities of various organizations in Africa. Includes a bibliography and a selected list of useful names and addresses. 90 pp.

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CODEL. A Note on Ecodevelopment. n.d. CODEL, Inc., 79 Madison Avenue, New York, New York 10157, USA.

Ecodevelopment is a concept which emphasizes the interrelationship of the social, economic, and physical environments in all development efforts. It requires that projects focus on the basic needs of the poorest people; use local knowledge, values, and experience to find solutions to problems identified by local people; and recognize the relationship of people to their environment. Ecodevelopment incorporates a commitment to appropriate technology, the wise use of natural resources, and local participation in all phases of development. Proponents of this perspective stress that when such principles guide the planning of projects, development will be sustained after the project has ended, because it was planned within the total context of the human and natural environment. (6 pp.) Also developed by the CODEL Environment and Development staff is a role-playing exercise, based on a case example from Tlemcen, Niger, that was originally designed for use in seminars on "Relating Environmental Factors of Small-Scale Development Projects." (11 pp.) An outline of two ways to present the exercise and the CODEL workshop case-study material are available from the Non-Formal Education Information Center, College of Education, Michigan State University, 237 Erickson Hall, East Lansing, Michigan 48824-1034, USA.

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Congdon, R.J. (ed.). Introduction to Appropriate Technology: Toward a Simpler Life-Style. 1977. Rodale Press, Inc., 33 East Minor Street, Emmaus, Pennsylvania 10849, USA.

A comprehensive collection of essays, this handbook of tools and techniques in appropriate technology outlines the alternatives it offers in both developing and industrialized nations. Covers areas such as tools for agriculture, intermediate building technology, intermediate chemical technology, energy in rural areas, and pedal power, among others. Provides examples from Cuba and China, where people-oriented technologies are common. In addition, there are sections on linking technology with education and knowledge transfer, social aspects of production, and ties with specific industries. 205 pp.

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Darrow, Ken and Rick Pam. "Appropriate Technology Is Not Oil-Drum Gadgetry." Ideas and Action. No. 117, 1977. Freedom from Hunger Campaign (FFHC)/Action for Development, Food and Agriculture Organization of the United Nations (FAO), 00100 Rome, Italy.

The authors discuss the erosion of the meaning of "appropriate technology" and the false consensus which has resulted from the proliferation of the uses of the term. They stress that AT is an approach, rather than a technology, which couples development with demystification of knowledge and a resultant sense of self-reliance on the part of the people who use that technology. pp. 3-6.

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Darrow, Ken, Kent Keller, and Rick Pam. Appropriate Technology Sourcebook, Volume II. 1981. Appropriate Technology Project, Volunteers in Asia, Box 4543, Stanford, California 94305, USA.

Identifies practical sources on successful small-scale technologies that can be adapted and produced elsewhere without need to import equipment or be subject to patents or royalties. All references deal with tools and techniques that are low in capital costs; usually use locally available materials and local organization; can be produced with, at most, a small metal-working shop; are understandable to individuals without a high level of Western-style education in either management or technology; create jobs utilizing local skills and labor; and, finally, utilize renewable energy sources such as wind power, solar energy, water power, methane gas, animal power, and pedal-power. This sourcebook's main function is to establish horizontal communication among groups and individuals experimenting with technology that can be understood, built, used, and maintained by villagers, with little or no dependence upon materials and skills from outsiders. Those technologies must be in harmony with cultural traditions of the area. The book is divided into an introductory section which defines appropriate technology, its goals, and its impact; a section listing names and addresses and other relevant information of or about publishers, sources, and bookstores which deal with appropriate technology materials; a similar section on periodicals; and extensive annotations on materials covering general practical references, tools, energy, water supply, agriculture, health care, food preservation and storage, architecture, housing and construction, print, cooperatives, beekeeping, soap-making, and miscellaneous village industries. 816 pp.

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Darrow, Ken and Rick Pam. Appropriate Technology Sourcebook, Volume I. 1976. Appropriate Technology Project, Volunteers in Asia, Box 4543, Stanford, California 94305, USA.

This is a practical resource book on appropriate technology for villages and small communities. It discusses the philosophy of appropriate technology, and critically analyzes alternative sources of energy, shop tools, agriculture, low-cost housing, health care, and water supply, while emphasizing local resources and small scale systems. More than 375 publications from American and international sources which provide practical information on the construction of technologies are also described. These were selected for their clarity, and for the uniqueness and low cost of the technologies they describe. Materials and production techniques required are listed for all equipment plans. Price, address, and language of publication are given for each. 304 pp.

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Dhamija, Jasleen. "Handicrafts: A Source of Employment for Women in Developing Rural Economies." International Labour Review. Vol. 112, No. 6, December 1975. ILO Publications, International Labour Office, CH-1211, Geneva 22, Switzerland.

Calls for development planning which recognizes and augments the roles of women as artisans, utilizing traditional handicrafts. The author argues that small outlays of capital in training and improvement of equipment could yield markedly increased per capita incomes without introducing any major disruption in social patterns. pp. 459-465.

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Eckaus, Richard S. Appropriate Technologies for Developing Countries. Prepared for the National Research Council. 1977. Printing and Publishing Office, National Academy of Sciences, 2101 Constitution Avenue, N.W., Washington, D.C. 20418, USA.

An economic analysis of technology which looks at several different ways of defining "appropriate". The authors point out that some of the criteria used for defining "appropriate technology" are potentially contradictory or at least unclear. For example, cost minimization and maximization of the availability of consumer goods may not be compatible with maximizing numbers of people employed. Other criteria for appropriateness of technology, while apparently desirable, are related to development in ways which are unclear. Political development, balance of payments relief, and improvement of the quality of life are examples. Information necessary to make decisions about technological matters is not always available. Moreover, these decisions are made by a wide variety of people who may not be utilizing the same criteria of appropriateness. Thus, coherence of technological decisions to a clear set of national goals is never fully achieved in development. 140 pp.

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Edinburgh, University of, Centre of African Studies, and School of Engineering Science. Appropriate Technology in Economic Development. 1973. Centre of African Studies, Adam Ferguson Building, University of Edinburgh, 40 George Square, Edinburgh EH8 9LL, Scotland, UK.

This document is a collection of papers read at the Edinburgh Seminar on Appropriate Technology in Economic Development. The Seminar explored values in various perspectives on appropriate technology and related those to the essential features of the development process in less-developed countries. It is divided into four sections. Section One deals with rural economy and agriculture; Section Two, science and engineering; Section Three, political economy and society; and Section Four, medicine. Selected references are included after each section. 454 pp.

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Edquist, Charles, and Olle Edqvist. Social Carriers of Technology for Development. Discussion Paper 123. 1978. Research Policy Program, Lund University, Magistratsvagen 55 N, S-222, 44 Lund, Sweden.

This paper raises and analyzes numerous questions about the relationship between the political economy and the tools and techniques of technology. Appropriate technology is addressed in two categories. One is appropriate technology for employment; the other is technologies for basic needs. To solve the problems of unemployment in LDCs, labor-intensive technologies which are efficient enough to provide reasonable incomes for the workers must be utilized not only in industry, but also in transportation, and especially agriculture. As with all technologies, these need effective social carriers, that is, those individuals or organizations which have both the interest in and the power to generate, choose, introduce, adapt, and/or improve the technology. Basic needs, on the other hand, are not as closely linked with appropriate technology, as many people are implying. Rather, it is the quantity, kind, and distribution of products which meet basic needs, not the technologies chosen. 88 pp.

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Edwards, A.L., I.C.A. Oyeka, and T.W. Wagner (eds.). New Dimensions of Appropriate Technology: Selected Proceedings of the 1979 Symposium Sponsored by the International Association for the Advancement of Appropriate Technology for Developing Countries. 1979. Division of Research, Graduate School of Business Administration, University of Michigan, Ann Arbor, Michigan 48109, USA.

This comprehensive collection of papers explores appropriate technology from a wide range of non-formal and formal education perspectives, including program planning, technology transfer, training, agriculture and rural development, health and nutrition, solar energy resources, and human resource development. 251 pp.

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Ellis, William N., George McRobie, Kenneth Darrow, and Frederick W. Smith. Appropriate Technology Developments in the United States and Their Relevance to the Third World. 1979. Development Centre of the Organisation for Economic Cooperation and Development, 94 rue Chardon-Lagache, 75016, Paris, France.

Discusses the diverse roots of the appropriate technology movement in Europe, the USA, and the Third World and concludes that appropriate technology has environmental, social, and economic goals. US groups further stress that appropriate technology is by the people, location specific, holistic, and futuristic. The authors then give a list and descriptions of US organizations which deal directly with appropriate technology. 159 pp.

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Elmendorf, Mary. Women, Water and Waste: Beyond Access. 1980. Equity Policy Center (EPOC), 1302 18th Street, N.W., Suite 502, Washington, D.C. 20036, USA.

A discussion paper for the EPOC Mid-Decade Workshop, "Women, Water and Waste," held in Copenhagen in 1980, which investigates the impact of water and sanitation programs on women and children, highlighting the role of women in determining success or failure. In a survey of practices and attitudes toward human defecation, the author brings out the importance of understanding socio-cultural constraints and motivations to participating in water and waste programs. Elmendorf makes a plea for more research that will help define water-related problems clearly and devise culturally acceptable solutions that women will support. 22 pp.

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Fuglesang, Andreas. Doing Things...Together: Report on an Experience in Communicating Appropriate Technology. 1977. Department of the Prime Minister, Office of Village Development, P.O. Box 6937, Boroko, Papua New Guinea; and Dag Hammarskjold Foundation, Ovre Slottsgatan 2, S-752 20 Uppsala, Sweden.

This report of a workshop on Appropriate Technology in Village Development, held in Papua New Guinea, discusses the content of the workshop, the purposes and impact of appropriate technology in the ideological and political context, and problems in communication with participants of the conference and with villagers. Throughout the report the author combines his analysis of the workshop with his intuitive impressions of the participants' responses; and in so doing, he provides the development planner and/or fieldworker with a sensitive account of cultural differences in perspective on appropriate technology. 180 pp.

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Fujimoto, Isao. The Values of Appropriate Technology and Visions for a Saner World. 1977. National Center for Appropriate Technology, P.O. Box 3838, Butte, Montana 59701, USA.

This article analyzes the values of appropriate technology for Third World countries. It examines the fallacy of the technological paradigm by comparing quality of the product with quantity and addresses the questions of technological fit and elitism. Four basic values inherent in appropriate technology are described. The first is the premium placed on self-reliance. The second emphasizes respect for decentralization, with resultant independence and self-determination. The third stresses cooperation rather than competition. And the fourth recognizes the importance of accountability. 3 pp.

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Galtung, Johan. The North/South Debate: Technology, Basic Human Needs, and the New International Economic Order. World Order Models Project, Working Paper No. 12. 1980. Institute for World Order, Inc., 777 United Nations Plaza, New York, New York 10017, USA.

Contains two articles focusing on the need to achieve humane development through strategies aimed at diminishing the North's economic and technological dominance of the South. The first article, "Towards a New International Technological Order," examines the negative consequences of western technology in Third World culture and development. The author considers possible criteria that might be used in the selection and introduction of technologies in an effort to deter or minimize the potential negative effects. The second article, "The New International Economic Order and the Basic Needs Approach," compares assumptions and implications contained in the New International Economic Order with those embodied in the basic human needs strategy. 50 pp.

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Gustafsson, Hans. The Lund Monitor on Technological Trends and Challenges to the Third World: The Cases of Micro-Electronics and Biotechnology: A Project Synopsis. Research Policy Studies Discussion Paper No. 137. July 1980. Research Policy Institute, Lund University, Magistratsvagen 55 N III, S-222 44 Lund, Sweden.

While this report does not deal directly with appropriate technology, the Lund Monitor discussed may have implications for the transfer of all types of technology. Basically, the Lund Monitor is an early warning system which incorporates an international monitoring of technological developments and trends, identification of potential opportunities and negative effects of new technologies, and interpretation of those opportunities and negative effects in terms of the resources, needs and objectives of the less-developed country concerned. Finally, the system helps to identify key points of intervention to maximize the possibilities and minimize negative effects. 32 pp.

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International Agricultural Centre (IAC). The Small Farmer and Development Cooperation. Final Report on the Preparatory Investigations. Vol. 1. n.d. IAC, Lawickse Allee 11, P.O. Box 88, Wageningen, Netherlands.

Sketches characteristics of small farmers and their changing physical and socio-economic world. A major conclusion is that the incorporation of small farmers into large political and social systems without their active participation in project planning serves to increase their dependence and helplessness, and to decrease their productivity, through the rapid depletion of natural resources. Recommendations include drawing small farmers into the planning and evaluating stages of development projects, and developing technologies that they can control completely. Research suggestions are presented. 32 pp.

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IWTC Newsletter. "Women and Appropriate Technology." No. 9, April 1979. International Women's Tribune Center, Inc. (IWTC), 305 East 46th Street, Sixth Floor, New York, New York 10017, USA.

Provides an overview of appropriate technology (AT) specifying the "technological roles" women play. In addition, it highlights agricultural and fuel-related technologies which may be useful in meeting the domestic agricultural needs of women. AT projects for women in Papua New Guinea, Thailand, Colombia, and Kenya are also described. (32 pp.). No. 7 (July 1978, 32 pp.) presents an annotated listing of AT technical assistance groups and materials with a focus on women's roles.

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Kaplinsky, Raphael. Accumulation and the Transfer of Technology: Issues of Conflict and Mechanisms for the Exercise of Control. Discussion Paper No. 224. 1975. Institute for Development Studies, University of Nairobi, P.O. Box 30197, Nairobi, Kenya.

Control in the transfer of technology stems from the ability to manipulate financial and technical resources which are necessary for capital accumulation within the world system. Invariably in the transfer of technology this control rests with the technology-supplier rather than the host-partner or host-state. A distinction is made between the substance of control and the appearance of control. Power rests with technological dominance, although there may appear to be equity between partners in an agreement of technology transfer. 60 pp.

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Kassapu, Samuel. "Technology That Won't Take Root." Ceres. Vol. 12, No. 2, March-April 1979. Food and Agriculture Organization of the United Nations (FAO), Via delle Terme di Caracalla, 00100 Rome, Italy.

Critically examines reasons why modern technological methods of production are ill-suited for African countries which rely on communal forms of production. pp. 41-46.

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Khurana, Rakesh et al. Study of Khadi Marketing Objectives, Strategy and Operational Policies. 1976. Indian Institute of Management, Ahmedabad. For information write to Khadi and Village Industries Commission, Irla Road, Vile Parle (West), Bombay 400056, India.

Discusses strategic issues relating to marketing Khadi, a hand-loomed cloth, and recommends appropriate planning, pricing, and promotion strategies. The Khadi and Village Industries Commission (KVIC) was established in 1953 by the Indian government in order to generate employment by supporting small-scale industries. Among the goals of the Khadi movement are fostering rural self-reliance and a spirit of independence from foreign economic domination. Although this report focuses on the production of Khadi, the KVIC also assists a vast range of rural industries including beekeeping, soap, shellac, matches, and agro-industries. 163 pp.

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King, Kenneth. The African Artisan. 1977. USA: Teachers College Press, Columbia University, 1234 Amsterdam Avenue, New York, New York 10027, USA. Overseas: Heinemann Educational Books Ltd., 48 Charles Street, London W1X 8AH England, UK; P.M.B. 5205 Ibadan, Nigeria; P.O. Box 45314, Nairobi, Kenya; P.O. Box 3966, Lusaka, Zambia.

Describes and analyzes the process of training and skill acquisition in the informal sector of Kenya, which includes thousands of small-scale entrepreneurs and producers operating on the fringes of the modern economy. Of interest to both educational planners and economists, the book traces the history of skill development and the spread of intermediate technology in the informal sector against a background of intervention by the state in the production of skilled labor. 226 pp.

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Mazonde, Isaac Ncube. Science and Technology for Development in Botswana: A Critical Appraisal with Emphasis on Appropriate Technology for Rural Development. Working Paper No. 21. November 197[illegible]. National Institute for Research in Development and African Studies (NIR), Documentation Unit, University College of Botswana and Swaziland, Private Bag 0022, Gaborone, Botswana.

This is an appraisal of the role of science and technology in less-developed countries in general and in Botswana in particular. It distinguishes between appropriate and intermediate technology. Appropriate technology is defined as technology which is controlled by the economic development model of the country, sub-continent, or continent concerned; considered appropriate by the people who will use it; and which will preserve and harmonize with the physical environment. Thus, what is "appropriate" is situationally defined and will vary from one place to another and one time to another. In addition, appropriate technology must be labor intensive, utilize local materials, and be inexpensive. On the other hand, intermediate technology is a cross between foreign, advanced technology and indigenous technology. In the view of this author, indigenous technology sets limits on human abilities to glean maximum benefits from nature, and is, therefore, not considered appropriate. Technologies which are appropriate can be reached by one of three methods: (1) improvement of indigenous technology; (2) modification of sophisticated technology to meet the needs of a developing country; or (3) combination of technological knowledge to meet the unique demands of a clearly defined problem. The remainder of the paper analyzes details of conditions in Botswana in terms of economy, agriculture, education, political structure, physical environment, and existing small-scale industry as background for determining the appropriateness of technologies introduced. 36 pp.

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McPhun, M.K. "Teaching Appropriate Technology in the Engineering Degree." Appropriate Technology. Vol. 6, No. 3, December 1981. Intermediate Technology Publications Ltd., 9 King Street, London WC2E 8HN, England, UK.

This article describes a degree program at the University of Warwick which accepted its first students in October 1980. Curriculum stresses concern with social objectives, including questions of potential labor displacement or employment. Technical skills are taught in the context of creating and using (or not creating and using) technology to meet those objectives. pp. 22-24.

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McRobie, George. "Intermediate Technology: Small is Successful." Third World Quarterly. Vol. 1, No. 2, April 1979. Third World Quarterly, New Zealand House, Haymarket, London SW1Y 4TS, England, UK.

A survey of the applications of intermediate technology around the world. Based on the assertion that there are many alternatives to the complex, capital-intensive, environmently destructive technologies of developed countries, the author proposes four criteria to explain the concept of intermediate technology: small in scale, simple, low capital outlay, and non-violent. These criteria, formulated as a result of actual experiences in developing countries, have been shown to strengthen local people's capacities to help themselves. The article includes descriptions of projects, programs, and centers worldwide which have developed and employed intermediate technologies involving various forms of production, processing, and training. pp. 71-86.

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McRobie, George. Small Is Possible. 1981. Harper and Row, Publishers, Inc., 10 East 53rd Street, New York, New York 10022, USA.

The intent of this book is to illustrate how the ideas E.F. Schumacher put forth in Small Is Beautiful are being implemented around the world. Part One describes the development and current activities of the Intermediate Technology Development Group (ITDG), of which Schumacher was a founding member. In developing countries, ITDG has been involved in projects that range from designing appropriate community health-care systems, to modifying indigenous agricultural tools to lighten women's workload. Part Two contains accounts of the intermediate or alternative technology movements in Britain, the USA, and Canada. In Part Three the author envisages an economic system in which people would be more important than goods. He argues that, particularly in the developing countries, the groundwork has been laid; what is needed is widespread support from governments and the international community. Two supplements provide information about AT groups in Africa, the Indian Sub-continent, Latin America, and additional examples of British groups. 331 pp.

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Mendis, D.L.O. Some Thoughts on Technology Transfer for Irrigation and Multi-Purpose Projects in Sri Lanka. 1977. Water Resources Board, P.O. Box 34, Colombo, Sri Lanka.

Technology transfer that doesn't always live up to its expected returns is the theme of this report. 19 pp.

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New Internationalist. No. 63, May 1978. New Internationalist Publications, 113 Atlantic Avenue, Brooklyn, New York 11201, USA; or New Internationalist, Montagu House, High Street, Huntingdon, Cambridgeshire PE18 6EP, England, UK.

This special issue devotes its coverage to many of the factors linking technology to poverty in the developing world. "Dancing South to South" by Peter Adamson (pp. 5-7, 18) explores the advantages and disadvantages of a controversial concept of technology transfer called Technical Cooperation Among Developing Countries (TCDC). This approach encourages Third World countries to choose from several different technologies developed within their own regions and geared to their own needs, rather than receiving such assistance only from more industrialized countries. "A Bridge Across the Southern World" (pp. 8-9) illustrates how TCDC is being actively pursued as a development strategy in many parts of the developing world. Of particular relevance for agricultural technology is Mallika Wanigasundara's report "Break-Through in Sri Lanka" (pp. 14-15), describing a locally developed rice-processing technology which holds great promise for production in rice-belt countries, yet is encountering heavy resistance from the industrialized world. "Small Is Difficult" by Maggie Black (pp. 19-21) examines the problems that have accompanied the transfer of appropriate technology through the village technology movement. 32 pp.

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Nji, Ajaja. "Technology, Women, Agricultural and Rural Development in Africa." Approtech. Journal of the International Association for the Advancement of Appropriate Technology for Developing Countries (IAAATDC). Vol. 3, Nos. 2 and 3, September 1980. IAAATDC, University of Michigan, 603 East Madison, Ann Arbor, Michigan 48109, USA.

Discusses the role of African women in agriculture and examines the effect of technology on social relationships in Africa. Argues that while technology may improve productivity, it could also have the hidden negative function of disproportionately increasing the workload of women. The author concludes that technical innovation which does not take into account traditional socio-economic and cultural relationships will not bring about significant agricultural and rural development in Africa. pp. 3-8.

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Norwood, Frank W. "Broadcast Satellite: 'Appropriate Technology' Available Now." International Education and Cultural Exchange. Vol. 13, No. 3, Winter 1978. Exchange Magazine, CU/ACS, Room 418, SA-2 Department of State, Washington, D.C. 20520, USA.

Distinct from the definitions of appropriate technology which emphasize local resources and labor-intensive methods, the author of this article describes communication satellites as appropriate to the developing world. Where roads, educational institutions, and similar facilities are not highly developed, communication (often two-way communication) via satellite leaps the stage on some infrastructural development. Although few countries have the technology or resources to launch satellites, earth station receivers may be relatively inexpensive and easy to produce and provide communication possibilities the content of which can be locally controlled. Not only can news be braodcast via satellite, but also exchanges of educational content and medical information are possibilities, among others. pp. 27-32.

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O'Kelly, Elizabeth. Rural Women: Their Integration in Development Programmes and How Simple Intermediate Technologies Can Help Them. 1978. Available from Elizabeth O'Kelly, 3 Cumberland Gardens, London WC1X 9AF, England, UK.

The author suggests that Intermediate/Appropriate Technology can assist rural women to attain a higher standard of living, without bringing about drastic changes in their present way of life. The study, based on personal experiences, is focused on African and Asian women but the generalizations are applicable in all rural areas. Appendix contains useful addresses and references. 84 pp.

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Pakistan, Government of. Appropriate Technology Development Organisation: Charter of Work, Major Tasks and Requirements and Concept of Programme. n.d. Available from the Non-Formal Education Information Center, College of Education, 237 Erickson Hall, Michigan State University, East Lansing, Michigan 48824-1034, USA.

Discusses issues that arise when introducing appropriate technology in terms of education required to utilize it, creation of jobs in proportion to the capital outlay, impact in motivating people toward self-help, creation of a technical cadre with leadership skills, village development through small-scale industry, and effective marketing and distribution systems. Concept of Programme describes the essential dependence of humans on nature, as a reminder that technology is not the ultimate source of sustenance. 7 pp.

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Reddy, Amulya Kumar N. "Appropriate Technology: The Standpoint of the Developing Countries and Projects in India." SKIP Newsletter. No. 54, February 1980. Skills for Progress (SKIP), 72 Brigade Road, Bangalore 560025, India.

This article sketches the historical development of the technologies of the industrialized world and their social, economic, and ecological consequences. In contrast to the accepted model which equates development with growth, Reddy proposes the following goals for economic and social change: (1) satisfying basic needs and reducing inequality, (2) "endogenous self-reliance," and (3) ecological soundness. The author then takes a critical look at the concept of appropriate technology in the light of these development goals. Reddy argues that developing communities could benefit most from a "dynamic mix" of traditional and "Western" technologies, adapted to the particular needs expressed by a community. Finally, the author draws a number of conclusions from the experiences of ASTRA, an Indian AT group. For AT groups and individuals in developed countries, Reddy suggests working with counterpart groups in developing countries to ensure that technologies will in fact address locally identified needs. pp. 11-23.

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Tinker, Irene. Women and Energy: Program Implications. 1980. Office of Women in Development (PPC/WID), Agency for International Development, Department of State, Washington, D.C. 20523, USA.

Deals with the effects of the rising cost of oil on poor rural women, the major managers and consumers of energy at the village level. Tinker argues that program designers must consider the total energy system and the tangible benefits of a proposed innovation to the users, as well as the opposition it may encounter, when advocating technologies and programs to reduce energy use in cooking, heating, and lighting. She suggests involving local women and children to obtain accurate information about their own energy practices. 12 pp.

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VITA News. "The Selling of 'Appropriate Technology.'" January 1982. Volunteers in Technical Assistance (VITA), 1815 N. Lynn Street, Suite 200, Arlington, Virginia 22209, USA.

Two articles of this issue feature the growing appropriate technology (AT) industry. "Selling 'Appropriate Technology'" by David Jarmul (pp. 3-5) discusses the problems faced and strategies used by AT firms crying to market their products in developing countries. Although some AT proponents oppose commercialization because of the belief that appropriate technologies should be developed and produced locally, many AT firms feel that they are performing an important service by making expertly-engineered, simple technologies available at very low costs. Reaching the people who need and can buy their products is the biggest problem they face. Marketing and advertising strategies they have employed include trade fairs, direct mail advertising, demonstrations, and free samples. Many also attempt to work through the existing networks of private voluntary agencies and nonprofit organizations. "You Must Go to the Consumer" (pp. 6-7, 23), an interview with a professional advertiser, Rita Korda, provides practical advice on marketing and advertising.

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2.0 SPECIFIC APPROPRIATE TECHNOLOGY TECHNIQUES

2.1 GENERAL

Agripromo. "Les Technologies Appropriees." No. 37, April 1982. INADES-Formation, 08 B.P. 8, Abidjan 08, Ivory Coast.

This special issue is based on the principle that the most appropriate technologies are in harmony with local customs and with the physical environment. Further, they can be supported by the financial, material, and educational resources of local communities, and can be controlled by the intended beneficiaries. Articles and interviews emphasize practical concerns such as how to choose a one, and promote new technologies, and how to use appropriate technology to alleviate women's work. This issue also includes a list of centers and organizations concerned with appropriate technology for rural areas. One of these explains how to construct an efficient wood-burning stove. Another gives step-by-step directions for improving traditional methods of palm oil extraction. 24 pp.

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Ast, G.A. and B.K. Kapoor. Teaching Rural Community Development: Muisuni, Kakuyuni, Kitwii. 1979. University of Nairobi, Department of Architecture, P.O. Box 30197, Nairobi, Kenya.

A report on a course in architecture and rural community development at the University of Nairobi in Kenya. The purpose of the course was to address the design and architectural needs and problems in rural areas. Students studied village technologies; problem identification; and project formulation, design, and evaluation. The report describes the field experiences of the students in three rural communities and includes many design briefs of facilities such as a primary school, a health center, a rural homestead, a children's home, and a market square. 102 pp.

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Borremans, Valentina. Reference Guide to Convivial Tools. 1978. Centro Intercultural de Documentacion (CIDCC), Apartado 479, Cuernavaca, Mexico.

A bibliography providing information on and a listing of convivial tools as defined by Ivan Illich. These "tools" are all the physical artifacts and institutions which produce either those artifacts or ideas. For instance, education would be included here. Those tools which are described as convivial "give each person who uses them the greatest opportunity to enrich the environment with the fruits of his vision." 320 pp.

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Canadian Hunger Foundation and Brace Research Institute. A Handbook on Appropriate Technology. 1976. Canadian Hunger Foundation, 75 Sparks Street, Ottawa, Ontario K1P 5A5, Canada.

Well-illustrated, this practical book is organized into four sections: (1) appropriate technology concepts--the need for it, options, marketing, and group credit; (2) twelve case studies--the smokeless stove in Ghana, farm implements for village cooperatives in Bangladesh, and solar distillation in Haiti; (3) information exchange--catalogue of tools, bibliography, and groups and people involved in appropriate technology development; and (4) perspectives on appropriate technology--how to introduce it into a community, ecological awareness, and longterm planning. 257 pp.

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Carruthers, R. "Appropriate Technology." Thutego Ya Bagolo Mo Botswana - Botswana Adult Education Newsletter. Vol. 1, No. 3, 1977. Botswana National Adult Education Association, P.O. Box 910, Gaborone, Botswana.

Briefly describes several projects developed by students in the Swaneng Hill Science Club in response to specific needs of Botswana, including solar cookers, a biogas cooker, a solar still for removing dissolved salt from water, and a humidity tent for hospital use. pp. 8-9.

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Carruthers, R. "Extension Work in Appropriate Technology." Thutego Ya Bagolo Mo Botswana - Botswana Adult Education Newsletter. Vol. 2, Nos. 3-4, 1978. Botswana National Adult Education Association, P.O. Box 910, Gaborone, Botswana.

Report on Progress in Botswana with several types of appropriate technology: alternative cooking methods, water purification, and income-generating technical skills. pp. 19-22.

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Commission on the Churches' Participation in Development (CCPD), World Council of Churches. Dossier on Appropriate Technology No. 2. CCPD Documents 16. 1979. World Council of Churches, P.O. Box 66, 150 Route de Ferney, CH-1211 Geneva 20, Switzerland.

This packet of materials reflects the increased emphasis on the "receiving" community's role as the principal agent in determining the usefulness of any AT strategy. The compilation includes background articles for communities seeking to use appropriate technology, an annotated list of useful publications, and two classification schemes to help village communities in identifying AT techniques. Available in both English and French.

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Dilts, R. and C. Thorburn. Applications of Appropriate Technology Within the Indonesian National Non-Formal Education Program. 1978. Liaison Resource Center, Project USPI, National Center for Non-Formal Education and Sports, (P.P.K.B.) Jayagiri, Lembang, Bandung, Indonesia.

Describes a project to disseminate appropriate technologies through non-formal community education. The project stresses community participation, income generation, cost-efficiency, appropriate educational methods, and the importance of resource and communication networks. The report presents several case studies which involved local people in learning to construct, maintain, and repair technologies such as several types of water pumps, a rapid sand water filter, compost piles, silk-screen equipment, and solar water heaters. 17 pp.

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Eaves, S.W. Relevant Technology for the Disabled. 1977. Integrated Education Project, P.M.B. 2174, Jos, Plateau State, Nigeria.

Describes integration of disabled people into the training program of the Relevant Technology Workshop of the Plateau Board for Integrated Education for Development. The project aims to coordinate services to improve the welfare of rural people, and to provide training in appropriate rural technology through the use of non-formal methods. Major portion of document is a pictorial survey of the handicapped at work making toys and educational and medical aids. 57 pp.

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Gram Praudyogiki. "Selected Technologies for Rural Women." Vol. 2, No. 1, March 1982. Centre for Rural Development and Appropriate Technology, Indian Institute of Technology, Hauz Khas, New Delhi 110016, India.

This issue presents introductory overviews and explanations of specific technologies which affect three aspects of rural women's lives. Section 1 begins with a philosophical discussion of the need for women to participate in the cash economy without excessive disruption of home and family responsibilities. This is followed by specific income generating activities, which include growing cash crops such as mushrooms and oil-producing plants; home-scale food processing and preparation; animal husbandry; beekeeping; and a wide range of small-scale manufacturing industries, such as match-making and chalk crayon production. Section 2 looks at the use of appropriate technologies to lighten the work load, especially the drudgery, of rural women. Here articles cover technologies for cooking, and drawing and fetching water. A description of a hand-operated torch (flashlight) which requires no battery concludes the section. Section 3 covers technologies for safe drinking water, latrines, housing, and mass health care. The final articles examine the roles of rural women in disaster preparedness for their families and communities. The issue is printed in English and Hindi. 114 pp.

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Hale, P.R. and B.D. Williams. Liklik Buk: A Rural Development Handbook Catalogue for Papua New Guinea. 1977. Liklik Buk Information Centre, P.O. Box 1920, Lae, Papua New Guinea.

This delightful collection is intended to promote appreciation for technology which people in villages can initiate, maintain, and control. Though designed for NFE practitioners in Papua New Guinea, the handbook should stimulate interest for all grassroots development workers. There are amply illustrated sections on crops and soil management, food preparation, building and road construction, village arts and crafts, energy, health, and promoting village development. One can learn how to make a vegetable nursery, bud a tree, control soil erosion, maintain a food storage house, pasteurize milk, make bread and build an oven in which to bake it, lay a roof, weave a basket, manufacture charcoal, make bricks, tan leather, operate a pressure lamp, build a water wheel, use solar energy, and make clothing. Interspersed throughout are lists of publications and organizations as well as editorial comments and suggestions. 270 pp.

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Hermann, Hans and Alex V. Hildebrand (compilers). 6th Training Course: Rural Mechanization and and Extension, Seminar Papers. 1981. University of Kassel, School of International Agriculture, Centre for Professional Studies, 3430 Witzenhausen, West Germany.

Includes papers which discuss issues surrounding rural mechanization, with examples from Germany and Third World Countries. Professors H. J. Glauner and P. Wolff provide specific instructions for detailed planning of extension programs, including analysis of needs, definition of objectives, choice of methods, final evaluation of the learning experience, and the use of photography in extension education. Appendices include examples of appropriate farming technology. 83 pp.

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India. Evaluation Study on Transfer of Technology Through Exchange of Farmers. 1976. Training Unit, Directorate of Extension, Ministry of Agriculture and Irrigation, Government of India, New Delhi 110001, India.

Describes and evaluates a program designed to provide rapid transfer of agricultural technology. Farmers lived in the households of other successful farmers from other regions for a short period. 27 pp.

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Institut Africain pour le Developpement Economique et Sociale (INADES). Amelioration des Techniques de Cuisson: Technologies Appropriees 1. 1982. INADES-Documentation, 08 B.P. 8, Abidjan 08, Ivory Coast.

A bibliography on appropriate technology for improved methods of food preparation. Sections cover traditional fuels, biogas, and solar energy systems for cooking and storage. In French. 26 pp.

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Institut Africain pour le Developpement Economique et Sociale (INADES). Amelioration des Techniques Traditionnelles de Construction: Technologies Appropriees 2. n.d. INADES-Documentation, 08 B.P. 8, Abidjan 08, Ivory Coast.

A bibliography on appropriate technology for improvements on traditional African construction techniques, and various ways of structuring villages and village architecture, with a section on African housing and construction organized geographically. In French. 37 pp.

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Institut Africain pour le Developpement Economique et Sociale (INADES). Stockage, Conservation et Transformation des Produits Alimentaires: Technologies Appropriees 3. 1982. INADES-Documentation, 08 B.P. 8, Abidjan 08, Ivory Coast.

A bibliography on appropriate technology for the storage, conservation, and processing of edible products. Separate sections cover post-harvest losses and information on specific foodstuffs. In French. 55 pp.

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International Institute of Rural Reconstruction (IIRR). The People's School: A Strategy for Integrated Rural Development. IIRR, 1755 Broadway, New York, New York 10019, USA; or IIRR, Silang, Cavite 2720, Philippines.

Discusses implementation and factors which contributed to the success of the People's School. The school sought to make appropriate technology available to the villagers by mobilizing and maximizing their human and material resources. Describes the development of curriculum and methodology to train community-selected villagers to diffuse technology related to crop and animal production, health, literacy, and other socio-cultural concerns. 11 pp.

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O'Kelly, Elizabeth. Simple Technologies for Rural Women in Bangladesh. 1977. UNICEF, Bangladesh Women's Development Programme, Dacca, Bangladesh.

The first chapter of this handbook describes in detail the tasks of rural women in Bangladesh, including information on the technologies and techniques they commonly use. The next section discusses the philosophy of intermediate technology and how it could be used to help these women. Specific intermediate technologies follow and include moderately inexpensive manufactured equipment as well as equipmert produced at home from locally available materials. A wide range of home and farm-related devices is covered, from water filtering and cooling systems, to food coolers, stoves, stacking cots, food dryers and smokers, poultry feeders, straw cutters, peanut (groundnut) shellers, rice hullers, sugar crushers, and coconut scrapers. Finally water systems, bamboo splitters and biogas production methods are given. In most cases drawings or pictures illustrate the mechanisms described and discussed. For those pieces of equipment which can be purchased a list of manufacturers' names and addresses is given. The final section is a bibliography of publications on or about intermediate technology and includes a list of useful addresses. 70 pp.

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South Pacific Appropriate Technology Foundation (SPATF). National Women's Workshop on Appropriate Technology: Tradition-Linked Technology. n.d. SPATF, P.O. Box 6937, Boroko, Papua New Guinea.

Reports on activities organized by SPATF as part of a National Women's Workshop on appropriate technology. The active group sessions covered use of a well-equipped kitchen, construction of a drum oven, village home technology, blacksmithing, sewing machine repair, and agriculture. In a final evaluation session, participants discussed the relevance of the activities to their particular situations and suggested improvements and alternative activities. 17 pp.

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The Urban Edge. "Low-Cost Construction for the Urban Poor." Vol. 6, No. 5, May 1982. Council for International Urban Liaison (CIUL), 818 18th St., N.W., Washington, D.C. 20006, USA.

As a follow-up to a previous issue (No. 5, 1979) which emphasized using local materials to reduce the costs of housing for the urban poor, this issue focuses on the work of several organizations working to combine traditional materials and new construction methods in order to help the poor obtain low-cost housing that can withstand rain, winds, and earthquakes. The Intermediate Technology Building Materials Workshop is one of the organizations highlighted. It has conducted projects and research with residents of several developing countries. It has also developed effective innovations in the construction of floors, foundations, and walls, and in the manufacture of bricks, roof trusses, and fiber-reinforced roofing sheets. The issue also includes short descriptions of several national programs, and of organizations concerned with appropriate technology. 6 pp.

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Tinker, Irene (ed.). Women and Development: Final Report of a Workshop Conducted by the American Association for the Advancement of Science (AAAS). 1979. AAAS, 1776 Massachusetts Avenue, N.W., Washington, D.C. 20036, USA.

Contains an important set of recommendations and background papers on such concerns as household energy, water supply, women's participation in technological and social change, and the impact of programs and policies on women. A paper by Maryanne Dulansey points out that appropriate technology "solutions" to food storage, processing, and cooking problems have failed because the women were not involved in deciding how the technology could best be used. Another paper by Grace Hemmings-Gapihan deals with the introduction of a complex solar unit, designed to run a graining mill and water pump, in a village in Upper Volta. 189 pp.

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Unesco. Appropriate Technology: A Bibliography of Books and Other Materials. November 1978. Unesco Regional Office for Education in Asia and Oceania, C.P.O. Box 1425, Bangkok, Thailand.

This bibliography includes key works on appropriate technology, divided into sections by geographic areas, by continent and some countries, and by end use of the technology. In the use of technology section there are categories commonly discussed in appropriate technology literature, such as energy, agriculture, water, health, sanitation, and food preservation and storage. In addition there are categories such as fish culture, women's concerns, educational equipment, and home improvement. The work also includes a list of periodicals, publications by and about organizations which deal with appropriate technology, and a list of names and addresses of publishers of appropriate technology literature. 103 pp.

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Volunteers in Technical Assistance (VITA). Village Technology Handbook. 1977. VITA, 1815 N. Lynn Street, Suite 200, Arlington, Virginia 22209, USA.

This excellent handbook describes techniques and devices which can be made and used in villages. Some of the practices suggested can be adopted on an individual basis, others require cooperation by many people and, sometimes, by government agencies. The book's aim is to gather in one publication information from many sources which has been found helpful in villages throughout the world. Instructions are accompanied by technical drawings. One can learn how to dig a well, pump water, build small earth-moving devices, irrigate, raise poultry, store food at home, make a mattress, build a bamboo shelter, construct in concrete, make a solar water heater, and do silk-screen printing. References are given for further reading in the various areas, and include information on cooperatives and credit unions. Conversion tables are also included. 387 pp.

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2.2 AGRICULTURE AND FOOD

ACARESC. Produza Mais Leite no Inverno Fazendo um Silo-Trincheira. n.d. ACARESC, Servicio de Extensao Rural, Rodovia Leoberto Leal S/N, Caixa Postal 502-Florianopolis, Santa Catarina, Brazil.

With text, pictures, and diagrams, this rural extension service booklet explains how to construct an underground silo for storing cattle forage. The trench silo is made with inexpensive, locally available materials, using the farmer's own equipment. It protects corn silage from water, rodents, and insects during the periods when fresh forage is not available. Its chief advantage is that farmers can construct it themselves, without the high investment represented in a large, conventional upright silo, while serving the same purpose of keeping the cows well fed and milk production up throughout the whole year. In Portuguese. 20 pp.

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Ahmad, Mohivadin and Andrew Jenkins. "Traditional Paddy Husking--An Appropriate Technology Under Pressure." Appropriate Technology. Vol. 7, No. 2, September 1980. Intermediate Technology Publications, Ltd., 9 King Street, London WC2E 8HN, England, UK.

Offers a comparative analysis of traditional household technologies versus imported technologies for post-harvest rice processing in Bangladesh. The authors discuss how the importation of automatic rice mills displaces workers, particularly women. Improving household production methods through AT strategies is seen as a more viable alternative for effectively using the existing female labor force to increase village production and income. pp. 28-30.

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Attfield, Harlan H.D. How To Make Fertilizer. IVS Technical Bulletin No. 4. 1978. International Voluntary Services, Inc. (IVS), G.P.O. Box 344, Dacca, Bangladesh.

An illustrated step-by-step guide for making natural fertilizer (compost pile). Includes a list of readily available waste materials that can be used. Text is in English and Bengali. 14 pp.

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Botswana. The Mochudi Toolbar: Makgonatsotlhe, The Machine Which Can Do Everything. 1975. Agricultural Information Service, Ministry of Agriculture, Private Bag 003, Gaborone, Botswana. Distributed by Mochudi Farmers Brigade, Box 208, Mochudi, Botswana.

Describes an agricultural implement which performs all the conventional steps of dryfarming tillage, as well as some less conventional operations. A separate booklet Makgonatsotlhe: Mochudi Toolbar gives a complete set of plans drawn to scale for the chassis, planter unit, fertilizer applicator, and accessories. 17 pp.

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Community Development Trust Fund of Tanzania. Appropriate Technology For Grain Storage in Tanzanian Villages. 1977. Economic Development Bureau, Inc., 234 Colony Road, New Haven, Connecticut 06511, USA.

A report of a pilot project in Tanzania for improving small-scale grain storage at the village level. Along with outlining the participatory "village dialogue" approach used by the project team, the report also highlights some of the perceived problems surrounding food supply and storage that emerged from the village discussion meetings, as well as suggested modifications for existing storage systems, the implementation of storage improvements, and recommendations for replicating the project in other regions of the nation. 94 pp.

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Fresco, Louise. "Crocodile Farming as a Small Farmer Project." Approach. No. 7, 1979. International Agricultural Centre, Lawickse Allee 11, 6700 AE Wageninger, The Netherlands.

Describes the National Crocodile Project which has been operating among traditional hunters and gatherers in Papua New Guinea for over 10 years. Crocodile farming is encouraged in remote areas for several reasons: the prices the skins fetch on the world market more than cover the production and transport costs; baby crocodiles and other inputs are all locally available; the by-products are recyclable; the activity does not hamper the other subsistence activities of the villagers; and crocodile farming is culturally acceptable. The author discusses many of the difficulties faced by the project and points out the long-term dangers of focusing on individual remuneration in the context of large-scale, capital-intensive farms in areas where tradition has stressed group efforts. pp. 38-44.

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German Adult Education Association. Make Your Own Oil. The "Good Idea" Series, No. 4. n.d. Africa Bureau, German Adult Education Association, P.O. 9298, Accra, Ghana.

Through written descriptions and numerous color illustrations by R. I. Amos, this booklet describes the equipment and processes for extracting palm, palm kernel, and groundnut (peanut) oil. 14 pp.

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Hibler, Michelle. "Less Waste, More Food." IDRC Reports. Vol. 7, No. 2, June 1978. International Development Center, Box 8500, Ottawa, Ontario K1G 3H9, Canada.

Cereals and grain legumes provide the major portion of calories and protein for people in Asia, Africa, and Latin America. However, by 1985 a shortfall in production of 76 million tons of cereal is predicted, Increasing production is one way to diminish the deficit; but despite development efforts, increase in production is not great enough to close the gap. Since estimates indicate that one-fourth to one-third of crops produced in less-developed countries are lost in harvesting, processing, and storage, improved efficiency at the post-harvest stage could represent substantial gains in grains available for consumption. Three projects are described which deal with multiple facets of the post-harvesting stage. pp. 19-21.

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Islam, Meherunnesa. Food Preservation in Bangladesh: A Manual for Instructors. Annexure No. 7 to Feasibility Survey of Productive/Income Generating Activities for Women. 1977. Women's Development Programme, UNICEF, Dacca, Bangladesh.

Describes in detail equipment, procedures, and pitfalls in bottling fresh fruits and vegetables, as well as providing recipes and procedures for making and bottling preserves, chutney, and relishes. Suggestions for teaching bottling are included as well as recipes for home production. There is also a section on setting up a cottage industry of fruit preservation. 51 pp.

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Kassapu, Samuel. "The Impact of Alien Technology." Ceres. Vol. 12, No. 1, January/February 1979. Food and Agriculture Organization of the United Nations (FAO), Via delle Terme di Caracalla, 00100 Rome, Italy.

Advocates more integration of traditional farming methods with technologies transferred to developing contexts. It also illustrates the consequences in African countries whenever indigenous methods have been ignored in the name of technology. pp. 29-33.

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Lindblad, Carl and Laurel Druben. Small Farm Grain Storage. VITA Publication Manual Series, No. 35E. ACTION/Peace Corps Programs and Training Journal Manual Series, No. 2. 1976. Volunteers in Technical Assistance (VITA), 1815 N. Lynn Street, Suite 200, Arlington, Virginia 22209, USA.

This manual contains some useful information for development workers about the nature of grain, the relationship of moisture and air to grain, preparing grain for storage (with a separate section on drying), protecting stored grain from insects and rodents, and various methods of storing the grain. Some of the methods of harvesting, drying, storing, and pest control utilize intermediate technologies and may even utilize locally available materials. The section on solar dryers is particularly helpful in this respect. Illustrations and scripts for presentation of some of the concepts are included, as well as drawings for building the various types of dryers and storage units. The section on pests and pest control would be useful to the field-worker as information about the nature of the pests, but less useful on pest control since the authors depend heavily upon use of chemical poisons. (Pages not numbered.)

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Swanson, Burton E. Organizing Agricultural Technology Transfer. The Effects of Alternative Arrangements. PASITAM Design Study. 1975. International Development Research Center, Indiana University, 1005 East 10th Street, Bloomington, Indiana 47401, USA.

Insuring that agricultural technology is appropriate to the developing countries rests, in part, on cooperative research efforts committed to finding practical solutions to agricultural problems. This paper discusses the use of international research centers to assist developing nations in organizing such institutions of their own. To illustrate the point, Swanson presents two papers, "Institution Building: The International Wheat Technology Development and Transfer System" and "Institution Building: Impact of the International Systems on National Capacity--The IRRI and CIMMYT Training Programs." The international research centers--the International Maize and Wheat Improvement Center (CIMMYT) in Mexico and the International Rice Research Institute (IRRI) in the Philippines--are assisting nations in developing their research capacities by offering usable organizational models and training strategies. 76 pp.

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Tachie-Menson, C.K.B. Make Your Own Bamboo Chicken House. The "Good Idea" Series No. 3. German Adult Education Association, Africa Bureau, P.O. Box 9298, Accra, Ghana.

Through photographs, drawings, and written instructions, this booklet describes how to make a chicken house from nails and bamboo poles, using only such tools as a hammer and a handsaw. 16 pp.

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"Tanzania: Grain Storage at the Village Level." Ideas and Action. No. 120, 1978. Freedom from Hunger Campaign (FFHC)/Action for Development, Food and Agriculture Organization of the United Nations (FAO), Via delle Terme di Caracalla, 00100 Rome, Italy.

Describes the process in which villagers, with minimal assistance from an outside development team, analyzed their problems with grain storage, devised solutions, and then modified existing structures or built new ones to meet their storage needs, using local designs, materials, and techniques. pp. 3-6

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United Nations Economic Commission for Africa (UNECA). Workshop on Food Preservation and Storage. 1975. UNIPUB, 1180 Avenue of the Americas, New York, New York 10036, USA; or African Training and Research Centre for Women, UNECA, P.O. Box 3001, Addis Ababa, Ethiopia.

A report of a workshop jointly sponsored by the government of Tanzania, UNICEF, the United Nations Economic Commission for Africa, and Food and Agriculture Organization of the United Nations. Participants from different regions in Tanzania studied traditional food storage and preservation methods, causes of food spoilage, and principles of conservation. They also discussed food storage and preservation in relation to nutrition, and considered the relationship between adequate food supplies, family size, health, and welfare. Several practical projects were carried out during the workshop. For example, participants built an improved rat-protected grain store and a solar dryer, using locally-available materials. Attention was given to food preservation as a small-scale industry and potential source of income for women. Finally, participants planned ways to share what they learned with their own communities. 102 pp.

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Vickery, Deborah and James Vickery. Intensive Vegetable Gardening for Profit and Self-Sufficiency. Program and Training Journal, Reprint Series No. 25. March 1978. ACTION/Peace Corps, Washington, D.C. 20525, USA.

Numerous techniques and pieces of equipment are described which are inexpensive to moderate in cost or which can be made from locally available materials. Several types of equipment for easy-to-build-and-maintain irrigation schemes are included, as well as a selection of carts and carrying devices and a portable bamboo compost bin. There are instructions for making a shovel and a scoop from metal barrels, and brief descriptions of gas-powered tools, such as hand tractors and a shredder/grinder. Perhaps the most interesting of all, however, is a portable chicken-roost built of wire mesh over a bamboo or wood frame. The roost is designed to be the same size as raised beds, so that after a crop is harvested, the roost can be set into the bed and the chickens will eat the remaining unusable plant parts, in addition to providing fertilizer. 159 pp.

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Volunteers in Technical Assistance (VITA). Environmentally Sound Small Scale Agricultural Projects: Guidelines for Planning. 1979. VITA, 1815 N. Lynn Street, Suite 200, Arlington, Virginia 22209, USA.

This is a first in a series of Planning Guidelines, produced by Volunteers in Technical Assistance (VITA). With admirable clarity it explains the dynamics of an ecosystem--a complex of living organisms interacting with one another as well as non-living substances. When agriculture impinges on an ecosystem, positive or negative reactions take place; the knowledge of these is essential to farmers and agricultural planners. The booklet contains guidelines on water, soil, nutrient, and pest managment. There are suggestions on how farmers could solve such problems as erosion, preparation of manure, and pest control by using simple methods that rely on local labor and materials. Also available in Spanish. 103 pp.

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Westley, Sidney B. and Bruce F. Johnston (eds.). Proceedings of a Workshop on Farm Equipment Innovations for Agricultural Development and Rural Industrialisation. Occasional Paper No. 16. 1975. Institute for Development Studies, University of Nairobi, P.O. Box 30197, Nairobi, Kenya.

These proceedings focus on several points related to the needs of Kenya's small farmers. One is the use of inexpensive equipment and tools which would decrease labor requirements and allow greater control over the timing of preparation and planting in anticipation of maximum use of seasonal rainfall. Another point is that these tools should be specifically designed for local conditions, and should be locally made and locally repaired. Costs must be kept low because of the very limited cash incomes of the farm families which need them most. Still another is that on marginal to moderately productive land, ox-drawn equipment could be beneficially used to a much greater degree than at present. Oxen are traditionally kept on many of the farms, but their work capacity is underutilized. The oxen must graze, however, which may not be profitable on land highly productive for other uses. Where lands are appropriate for oxen, it will be necessary to train women to handle them--unless families find the new methods of farming profitable enough for the men, who traditionally handle the oxen, to be able to remain on the land. 238 pp.

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2.3 COMPOSITE

Advisory Committee on Technology Innovation, Board on Science and Technology for International Development, Commission on International Relations, National Research Council. Supplement, Energy for Rural Development: Renewable Resources and Alternative Technologies for Developing Countries. 1981. National Academy of Sciences, National Research Council, 2101 Constitution Avenue, Washington, D.C. 20418, USA.

A report on recent developments in renewable energy resources and alternative technologies, prepared to update a similar report published in 1976. Concerned with small, inexpensive energy systems that can be operated locally, this volume focuses on three areas: direct uses of solar energy; indirect uses of solar energy including energy from wind, falling water, and biomass; and other aspects of energy technologies such as geothermal energy, energy storage, pedal power, and external combustion engines. Although the technologies presented are appropriate for developing countries, they are still in various stages of development, and must be pilot-tested to be made cost-efficient and adaptable to local conditions. Appendices include lists of manufacturers of energy-related devices, centers of research and development, and suggested reading. 238 pp.

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Agency for International Development (AID). Visuals for Villagers. AID, Department of State, Washington, D.C. 20523, USA.

Offers instructions for constructing and using moderate to low-cost visual aids. Includes section on lettering, layout, blackboards, chalkboards, flannel-boards, flip-charts, posters, exhibits, and displays. 70 pp.

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AKAP Research. Lampuyan. Ideas for Community Projects on Medicinal Plants. 1980. AKAP Research, 66 J.P. Rizal, Project 4, Quezon City, Philippines.

A series of information sheets providing ideas for teaching and learning about medicinal plants. Topics covered include ways of learning to identify medicinal plants, procedures for their collection and storage, plant cultivation, and methods for preparing medicinal plants for use. Also includes suggestions for demonstrating plant preparation and use. The text is accompanied by illustrations of step-by-step procedures. 47 pp.

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Cawood, W.N. and P.A. Billinghan. Introductory Guide to Solar Energy. Revised Edition. 1977. National Building Research Institute, Council for Scientific and Industrial Research, P.O. Box 395, Pretoria 0001, South Africa.

This booklet is divided into three parts. Part 1 discusses rationale behind using solar energy. Parts 2 and 3 describe a practical solar water heater with a step-by-step explanation of how to make it, including layout, quantity and quality of materials needed, and directions for construction. 39 pp.

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Chinnery, D.N.W. Solar Water Heating in South Africa. National Building Research Institute Bulletin 44. 1971. Council for Scientific and Industrial Research, P.O. Box 395, Pretoria 0001, South Africa.

Discusses solar water heating processes and procedures as a practical proposition for most of South Africa. Explains system of thermosiphon in mathmetical terms as well as through designs and diagrams. Compares absorption capacity of nine various absorbers designed and developed in this research project and illustrates results in graphic form. It also describes in detail designs and measurements required for the construction of a solar water heater, including methods of combining it with other water-heating systems. Practical problems such as architectural barriers in construction and installation of salt water heaters are considered. 79 pp.

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Development Communication Report (DRC). "Reconsidering Print." No. 21, January 1978. Clearinghouse on Development Communication (CDC), 1414 22nd Street, N.W., Washington, D.C. 20037, USA.

A special issue that focuses on the role of the print media in developing countries. Articles describe The Moalboal Times, an erasable blackboard newspaper in the Philippines, the use of screen-printed cloths as audio-visual teaching aids. "Cheap and Easy," a regular feature of DCR, offers instructions for making a simple hectograph (spirit duplication machine). (16 pp.) In another issue of DCR, "The Village Printer: Paper Making Demystified" (No. 28, October 1979, p. 11) discusses the basic papermaking process and describes how a set of rubber stamps was used in functional literacy classes in Bangladesh.

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Donoghue, Beverly E. Textile Visual Materials: Appropriate Technology in Action. 1982. Beverly Emerson Donoghue, 118A West Tenth, Austin, Texas 78703, USA.

Describes a project begun in 1974 in Ghana to meet the need for visual materials in a country which had no paper or paper-printing industry. With a strong literacy campaign underway, durable, inexpensive, readily-available teaching materials were needed throughout urban and rural areas. Cotton cloth printing has a long tradition in Ghana, so cloth for banners and clothing was locally designed and produced to meet the specific national needs. It proved to be highly successful. A feasibility study for continuation and partial re-introduction of the program was conducted in 1980. The conclusion was that adequate supplies were available if production took place at a specialist training college; further, that projected costs were well within the acceptable range. 11 pp.

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England, Roger (compiler). How to Make Basic Hospital Equipment. 1979. Intermediate Technology Publications Ltd., 9 King Street, London WC2E 8HN, England, UK.

An illustrated book of simple designs for a range of low-cost hospital equipment, many from the intermediate technology workshops of Zaria, Nigeria. The purpose of the book is to help solve the problem of equipping rural hospitals by relying on local materials, resources, skills, and ingenuity. Among the designs included are: folding bed, wheelchair, bicycle, ambulance, suction pump, infant-weighing scale, baby incubator, and walking frame. 86 pp.

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Ghana. Make Your Own Soap: An Aid to Extension and Village Workers in Ghana. n.d. Department of Social Welfare and Community Development, Africa Bureau, German Adult Education Association, P.O. Box 9298, Accra, Ghana.

This step-by-step guide on soap-making is intended as an aid for those producing either for home consumption or as cottage industry. It is well-illustrated and includes information on equipment, how to correct mistakes or problems when a batch of soap has not turned out well, and lists of procedures for making five types of soaps. 15 pp.

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Hopkins, Anthony. "Paper-Making". Basics 5. October 1978. Rural Communications, 17 St. James Street, South Petherton, Somerset, England, UK.

Provides detailed instructions for making paper and briefly discusses papermaking as a cottage industry. pp. 2-4.

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Hutt, J.K. Rattan and Bamboo. 1979. Duncan Guthrie, Disabilities Study Unit, Wildhanger, Amberly, Arundel, West Sussex BN8 9NR, England, U.K.

Gives excellent detailed working drawings for equipment for handicapped children, designed by a physiotherapist. All of the items diagrammed, ranging from wheelchairs to feeding aids, can be constructed by using two basic materials--rattan and bamboo. 14 pp.

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Karunairajan, Richards D. The Bio-Gas Way. 1980. Serendeepam, Sithankerny N.P., Sri Lanka.

The first in a series on "Technology for Progress," this booklet argues that bio-gas technology is a vital part of rural development, and can contribute significantly to overcoming energy shortages in developed and developing countries. The author describes the bio-gas system and its operation in some detail, giving attention to technical and financial assistance that may be needed, potential health hazards, the biology of bio-gas, and the use of community digesters. Several bio-gas plant models, including the "Indian," "Chinese," and "Taiwan" plants are mentioned, and a bio-gas project in the Philippines is highlighted. 23 pp.

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Lawrence, Robert de T. Rural Mimeo Newspapers: A Guide to the Production of Low-Cost Community Papers in Developing Countries. Reports on Papers on Mass Communication, No. 46. 1965. Unesco, Department of Mass Communication, 7 Place de Fontenoy, 75700 Paris, France.

This guide to the production of low-cost community newspapers in developing countries describes a successful project in Liberia in which thirty mimeographed newspapers were started within a year. The author suggests ways in which other countries may organize similar projects, and offers a simple how-to-do-it guide for editors and publishers of mimeographed newspaper. 42 pp.

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Macpherson, George A. First Steps in Village Mechanisation. Tanzanian Publishing House, P.O. Box 2138, Dar-es-Salaam, Tanzania.

Provides practical advice for training villagers to make their own tools and other objects. Self-reliance and people's involvement are at the core of the book which seeks to help people to creatively solve the technological problems in their own environment.

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Morley, David C. Can We Prevent One Quarter of All Deaths in Small Children by Functional Literacy? 1981. Institute of Child Health, University of London, 30 Guilford Street, London WC1N 1EH, England, UK.

A short note describing the use of a salt/sugar solution to counteract loss of sodium (often fatal in small children) during bouts of diarrhoea. A plastic two-ended spoon was first developed in Indonesia to measure correct quantitites of salt and sugar. These spoons, with instructions in several major languages, are now widely available. Morley suggests, however, that spoons could be made from local wood or bamboo, with the plastic spoon used only to check the measures made locally. Instructions, with figures for making the measure, are included. Writing instructions in the local language on the measuring implement may be one of the first tasks of a newly literate child or adult. Morley argues that this innovation could save many children from death due to diarrhoea. 3 pp.

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Postgate, Richmond, Peter M. Lewis, and William A. Southwood. Low-Cost Communication Systems for Educational and Development Purposes in Third World Countries. 1979. Intermediate Technology Development Group (ITDG), Ltd., 9 King Street, London WC2E 8HN, England, UK.

A report of low-cost communication systems and equipment, combined with a review of a number of existing small-scale communication projects in various Third World countries. The major focus is on the broadcasting media as an example of a communication system that is not necessarily dependent upon expensive and complex technology. The discussion presents the small-scale communication system as a viable alternative for developing countries, and one potentially more fitted to their specific needs. 223 pp.

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"Simple Gas Baloon for Storing Biogas." Science for Villages. Vol. 5, No. 9, 1982. Centre for Science for Villages, Magan Sangrahalaya, Wardha, India.

A brief description, of a technique developed by the Centre of Science for Villages. Tells how to construct, fill, and use a low-cost polythene balloon for storing biogas and transporting it from a gasplant to individual households. Clear illustrations are provided. pp. 6-7.

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Tan, Michael L. Philippine Medicinal Plants in Common Use: Their Phytochemistry and Pharmacology. 1980. AKAP Research, 66 J.P. Rizal, Project 4, Quezon City, Philippines.

A guide to over 200 medicinal plants frequently used in Philippine traditional medicine. Somewhat technical in style, the guide is intended for use by students and professionals working in community-based health programs. Each listing contains a description of plant characteristics, suggested preparations and uses, and precautions. Also includes information on simple weights and measures, common drug preparations, and an index to medicinal properties. 89 pp.

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Volunteers in Technical Assistance (VITA). Wood Conserving Cook Stoves, A Design Guide. 1980. VITA, 1815 N. Lynn Street, Suite 200, Arlington, Virginia 22209, USA.

This is an indispensable manual for anyone interested in energy-efficient, locally appropriate, wood-burning stoves. Complete step-by-step instructions, with clear illustrations, are given for building four different types of cook stoves. A second volume on the socio-cultural aspects of stove design and use is planned. Also of interest is the July 1980 issue of VITA News. Several articles in this "Special Energy Issue" discuss the shortage of firewood and how this is affecting women in developing countries. 113 pp.

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World Health Organization (WHO). "Appropriate Technology for Health." Offprint from WHO Chronicle, Vol. 34, No. 2, February 1980. ATH Newsletter, WHO, 1211 Geneva 27, Switzerland.

Lack of reliable information on appropriate technology for health holds back the development of primary health care in rural areas. This bulletin serves as an information exchange in communicating new ideas and innovations, and the results of experiences. 7 pp.

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2.4 WATER SUPPLY AND SANITATION

Attfield, Harlan H.D. Composting Privy. IVS Technical Bulletin No. 5. 1978. International Voluntary Services, Inc. (IVS), G.P.O. Box 344, Dacca, Bangladesh.

Provides step-by-step instructions, with illustrations, on building a compost privy (enclosed latrine). Text is in English and Bengali. 21 pp.

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Jackson, Ted. "Rural Sanitation Technology: Lessons from Participatory Research." Assignment Children. Reprint from No. 45/46, Spring 1979. UNICEF, Palais des Nations, 1211 Geneva 10, Switzerland.

A dossier in which the author considers the application of a participatory research approach to rural sanitation programs. Noting that sanitation facilities are grossly inadequate in rural areas in many developing countries, and that efforts to improve this situation have been uncoordinated and only partially successful, he examines recent literature on self-reliance, appropriate technolgy, and popular participation in relation to sanitation and water supply. The reprint concludes with lessons from such research in other areas that may have implication for sanitation technology projects in rural regions. 24 pp. (Assignment Children is published in French as Les Carnets de l'Enfance.)

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Kalbermatten, John M., DeAnne S. Julius, D. Duncan Mara, and Charles G. Gunnerson. Appropriate Technology for Water Supply and Sanitation: A Planner's Guide. December 1980. World Bank, 1818 H Street, N.W., Washington D.C. 20433, USA.

This is Vol. 2 of a series of publications entitled Appropriate Technology for Water Supply and Sanitation. These publications are reports of the research project undertaken in 1976 by the World Bank on appropriate technology for water supply and waste disposal in developing countries. Part 1 of this volume contains an introductory overview of the problem, health aspects, community participation in planning, and an economic analysis of sanitation technologies. Part 2 includes comparisons of factors affecting sanitation technologies, sequences in upgrading sanitary facilities, and a chapter containing flow charts of when to consider specific physical and sociocultural variables in choosing the most appropriate technologies. In Part 3 detailed descriptions, including drawings, are given of a wide variety of sanitation technologies at the level of individual households, communal facilities and off-site disposal and treatment. Includes bibliography. 194 pp.

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Mann, H.T. and D. Williamson. Water Treatment and Sanitation: Simple Methods for Rural Areas. Revised Edition. 1976. Intermediate Technology Publications, 9 King Street, London WC2E 8HN, England, UK.

This booklet discusses all phases of water treatment and sanitation for rural areas. Chapters 1 to 6 describe methods which may be applied in sequence, from the selection of a water source, the transport of water, the treatment of water, the disposal of wastes, sewage treatment and the final disposal of treated wastes, and the by-products of treatment processes. In each chapter a number of alternatives is described, some suitable for self-help situations, others which may be more suitable for larger communities. Thus, it provides information for the technician and the community development worker interested in developing and constructing systems to supply drinkable water and sewage disposal. It explains formulas, diagrams, and designs for construction. 90 pp.

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Mara, Duncan. Appropriate Technology for Water Supply and Sanitation: Sanitation Alternatives for Low-Income Communities--A Brief Introduction. Transportation, Water, and Telecommunications Department, The World Bank, 1818 H Street, N.W., Washington D.C. 20433, USA.

This booklet was written to acquaint development planners from a variety of disciplines with low-cost technologies currently available and to provide a guide for sanitation program planning in low-income (especially urban) communities. The language is non-technical and numerous drawings and plans are included. A list of publications on appropriate technology for water supply and sanitation is given. 50 pp.

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Miller, F. DeWolfe. "A Brief Assessment of Water Supply and Waste Disposal Systems in Developing Countries." Approtech. Vol. 3, No. 1, June 1980. International Association for the Advancement of Appropriate Technology for Developing Countries (IAAATDC), 603 East Madison, The University of Michigan, Ann Arbor, Michigan 48109, USA.

Miller first reviews the prevalence of water-related diseases in Africa, Asia, Latin America, and the Far East. The major part of the article is an evaluation of some recent efforts to improve sanitation and provide safe water, with emphasis on the use of local resources and appropriate designs and methods. The author considers several alternate means of increasing and improving a community water supply. In increasing order of difficulty to obtain and control, the list of methods includes rainwater catchment, protected springs, wells, boreholes, infiltration, and slow sand filtration. He also discusses the disposal of excreta and wastewater. In conclusion, Miller notes that community initiative and sustained participation in the installation and maintenance of a sanitation system is crucial for it to be adopted. pp. 7-13.

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Pineo, Charles S., David W. Schnare, and G. Wade Miller. Environmental Sanitation and Integrated Health Delivery Programs. American Public Health Association (APHA), International Health Programs Monograph Series, No. 4. 1981. APHA, International Health Programs, 1015 Fifteenth Street, N.W., Washington, D.C. 20005, USA.

The monograph places technological aspects of environmental health services in the context of inclusive health programs. The authors provide guidelines for planning, implementing, and evaluating environmental health programs and discuss various aspects of community participation in such programs. They emphasize that the key features of successful programs are: cooperation among planners, engineers, administrators, community health workers and villagers, and decentralization of responsibility. A useful selected bibliography and organization listing are provided. 82 pp.

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Roark, Paula. Successful Rural Water Supply Projects and the Concerns of Women. 1980. Office of Women in Development (PPC/WID), Agency for International Development, Department of State, Washington, D.C. 20523, USA.

Underlying this paper is the idea that change and development occur through people participating in a learning process. The author believes that project success depends on discovering and working through the "local learning system" (LLS), the culturally determined way knowledge is organized and shared. Because of their traditional roles as water carriers and managers, women's participation in related learning processes is critical. Ultimately, they are the ones to decide whether the new water source is worth the effort to use and maintain. To aid project planners, Roark offers an "LLS Operational Framework" containing four components: technology analysis, participation, information, and knowledge outcome. This framework distinguishes between service and development projects, with important implications for policy and program directions. 73 pp.

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Sander, William. The Impact of Two Communal Irrigation Projects in the Philippines. Discussion Paper 7917. 1979. Institute of Economic Development and Research, School of Economics, University of the Philippines, Diliman, Quezon City, Philippines.

Analyzes the economic impact of two communal irrigation systems in the Philippines. Both projects met at least some of the criteria for appropriate technology in that their construction was labor-intensive, utilized primarily local labor and materials, and could be maintained and used by the local people. Moreover, by providing the opportunity to grow at least two crops of rice per year, rather than one, they also provided employment in the local area. However, the benefits of the project were not equally available to all community members. For instance, land tenure and access to credit affected the returns to individual farmers. 23 pp.

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Shuval, H.I., C.G. Gunnerson, and D.S. Julius. Appropriate Technology for Water Supply and Sanitation: Night-Soil Composting. Vol. 10. 1981. Transportation, Water, and Telecommunications Department, World Bank, 1818 H Street, N.W., Washington, D.C. 20433, USA.

The World Health Organization has estimated that over two-thirds of humanity live without proper facilities for human waste disposal. In response to this serious health problem, and as a contribution to the International Drinking Water Supply and Sanitation Decade, the World Bank has prepared this study of low-cost, hygienic methods of collecting, composting, and recycling "night soil" or human wastes. Research has shown that treatment at very high temperatures (55-60°C) for several hours is the only way of ensuring that all disease-causing bacterial and viral pathogens in the night soil are destroyed. One system reviewed in this report -- Beltsville Aerated Rapid Composting (BARC) -- achieves extremely high temperatures with simple and inexpensive mechanical equipment. In conclusion, the authors recommend that "a series of research-pilot studies be undertaken in several developing countries to test the system under varying environmental conditions and night soil quality." 91 pp.

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Swiss Association for Technical Assistance (SATA). Manual for Rural Watersupply. 1975. SATA, P.O. Box 32, Buen, S.W. Province, Cameroon.

This manual contains information on a wide range of aspects of village water-supply systems, with special reference to projects and conditions in Cameroon. There are detailed drawings for standard designs of such facilities as a public wash-place, water storage and filter tanks, and a public fountain. Most of the manual, however, describes the necessary steps in planning, constructing, and maintaining the system from the initial analysis of quantity and quality of water, projection of future needs, preparing the application for project assistance, and maintaining records and finances, through delivery systems and the appropriate choices of valves, pipes, filters, pumps, and other construction details. A section on maintenance discusses common problems, how to prevent them and how to remedy them. Separate sections cover a range of water sources from springs and wells to rivers and streams, with discussion of the potential water quality of each and short term and long term costs for utilizing each. (Pages not numbered.)

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Tillman, Gus. Environmentally Sound Small-Scale Water Projects: Guidelines for Planning. 1981. Volunteers in Technical Assistance (VITA), 1815 N. Lynn Street, Suite 200, Arlington, Virginia 22209, USA.

Jointly published by Coordination in Development (CODEL) and VITA, this second volume of the Guidelines for Planning Series introduces several issues of interest to persons who plan and implement small-scale water projects. It reviews basic ecological principles; describes water-related diseases in some detail; considers ways to improve community water supply and sanitation; and discusses the role of water in agriculture. A final chapter gives step-by-step guidelines for project planning. 142 pp.

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Van Wijk-Sijbesma, Christine. Participation and Education in Community Water Supply and Sanitation Programmes. Technical Paper No. 12. Revised Edition. 1981. International Reference Centre for Community Water Supply and Sanitation, P.O. Box 5500, 2280 HM Rijswijk, The Netherlands.

This publication is an exceptionally thorough literature review which deals with the social and organizational, rather than strictly technological, aspects of water and sanitation projects. Many facets, including limitations of community participation, are discussed in conjunction with the stages of project planning, execution, continued maintenance, and evaluation. It is written from the perspective of the project planner as an individual, and covers not only the villager's social, cultural, and physical patterns, but also the social patterns and expectations of the organization with which the planner may be working. 222 pp.

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World Bank. Village Water Supply. 1976. World Bank, 1818 H Street, N.W., Washington, D.C. 20433, USA.

Discusses village water supply projects in terms of planning, organization, and managment; financial resources and needs; economic and social benefits of improved water supplies; the current inadequacy of safe drinking water in developing countries; and factors affecting the priority of projects. The annexes include data from a survey conducted by the World Health Organization on the current status of water supplies in developing countries and projected costs for providing adequate quantities and qualities. 96 pp.

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3.0 CONTINUING SOURCES OF INFORMATION

3.1 NEWSLETTERS, JOURNALS, AND DIRECTORIES

Appropriate Technology. Intermediate Technology Publications, 9 King Street, London WC2E 8HN, England, UK.

Initiated to meet the needs for communication of appropriate technology innovations throughout the world. Most of the articles are contributed by people working in the field and cover a very wide range of topics. Diagrams and pictures are often included as well as pointers about what has and what has not been successful in designing, improving and/or implementing the use of the technology discussed. This publication could prove invaluable for anyone interested in the concept of appropriate technology, but especially so for groups or individuals trying to devise solutions to practical problems in rural areas of LDC's. Appropriate Technology is written in English, but the language is not highly technical. Back issues of some volumes and photocopies of specific articles may be purchased. A free list of articles is also available from Intermediate Technology Publications Ltd.

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Appropriate Technology for Health. ATH Newsletter, World Health Organization (WHO), 1211 Geneva 27, Switzerland.

An occasional newsletter aiming to share information about simple technological solutions to health problems with those working in primary health care and rural development around the world. Each issue contains descriptions, pictures, and diagrams of health aids developed and used in various developing countries, as well as book reviews, letters from readers, and other useful information. "Health Education Methods and Materials in Primary Health Care" (Newsletter 10, December 1981, 24 pp.) is an especially useful resource for those concerned with culturally appropriate health education. The articles in this issue, contributed by health educators in Africa and Latin America, describe games, story-telling methods, popular theater techniques, and other learning methods and resources. Several articles give examples of visual learning methods for non-literates, focusing on the difficulty of designing appropriate visual aids that communicate the intended message to those who are unaccustomed to visual learning.

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Approtech. International Association for the Advancement of Appropriate Technology for Developing Countries (IAAATDC). IAATDC, 603 East Madison, The University of Michigan, Ann Arbor, Michigan 48109, USA.

This quarterly journal seeks to cover all aspects of appropriate technology in relation to development. Scholarly articles, research, and position papers as well as book reviews, announcements, and letters are included. Two recent Special Issues are "Medicine" (Volume 3, No. 1, June 1980) and "Food: Production, Processing and Distribution" (Volume 4, Nos. 3 and 4, September-December 1981).

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Basics: A Source of Shared Information on Rural Development. Rural Communication Services, 17 St. James Street, South Petherton, Somerset, England, UK.

A bi-monthly publication for sharing information with rural communities in developing countries on technologies relevant to their agricultural, food, health, housing, and educational needs. Complete with clear and detailed drawings, recent issues have provided step-by-step instructions for constructing an information storage and retrieval system, an energy-efficient wood-burning stove, toys for small children, a hand cart, and a soil-sterilization process. Also included are descriptions of programs and projects around the world involving appropriate technology. (Free of charge to village renewal development workers in non-industrial countries.)

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Ceres. FAO Review on Agriculture and Development. Food and Agriculture Organization of the United Nations (FAO), Distribution and Sales Section, Via delle Terme di Caracalla, 00100 Rome, Italy.

A bi-monthly journal dealing with many aspects of development. Occasionally articles on appropriate technology are also included.

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Development Forum. United Nations University and the Division of Economic and Social Information/DPI, DESI/DPI, Palais des Nations, CH-1211 Geneva 10, Switzerland.

Frequently contains a column on appropriate technology (AT). Recent articles have dealt with family-size biogas digesters gaining widespread use in China (Vol. 10, No. 2, March 1982); an AT network in Nepal (Vol. 10, No. 4, May 1982); and the impact of a locally-produced, locally-serviced and energy-efficient rice mill in displacing women from their traditional sources of income in the post-harvest processing of paddy (Vol. 9, No. 2, March 1981). Another issue (Vol. 9, No. 10, December 1981) contains numerous short descriptions of appropriate technologies for water and sanitation.

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Diarrhoea Dialogue. Appropriate Health Resources & Technologies Action Group Ltd. (AHRTAG), 85 Marylebone High Street, London W1M 3DE, England, UK.

This newsletter for primary health care workers, planners and administrators, researchers, and general readers focuses on diarrhoeal disease prevention and control. Concerns covered include oral rehydration, water supply, sanitation, and nutrition. Each issue contains news, reports, and letters received from health personnel worldwide. A "Practical Advice Series" presents useful information on such topics as "Choosing a Hand Pump" (No. 4, February 1981), "Persuading Children with Diarrhoea to Eat" (No. 6, August 1981), and "Carrying Out a Survey on Attitudes to Diarrhoea" (No. 9, May 1982). There is also a regular "Questions and Answers" section.

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Educational Building Digest. Unesco Regional Office for Education in Asia and Oceania, G.P.O. Box 1425, Bangkok, Thailand.

An occasional periodical providing detailed diagrams for designers of educational facilities, especially in developing countries. It includes practical information on planning the building program, making architectural and technical decisions and determining space norms. "Design Guide for Barrier-Free Schools" (No. 14, 1982) provides information on designing and adapting educational facilities that are accessible to physically disabled persons.

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Enfo. No. 1, December 1978. Environmental Sanitation Information Center (ENSIC), Asian Institute of Technology (AIT), P.O. Box 2754, Bangkok, Thailand.

Describes the goals and activities of ENSIC, an information center aimed at provinding up-to-date information about sanitation problems in developing countries. The newsletter providing information on ENSIC staff members, research activities of AIT, publications of faculty members, and a regional seminar on solid waste management. 12 pp.

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Ideas and Action. Freedom from Hunger Campaign (FFHC)/Action for Development, Food and Agriculture Organization of the United Nations (FAO), 00100 Rome, Italy.

Covers a wide range of topics on development, including appropriate technology, and is distributed free of charge. Published in English, French, and Spanish.

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The IDRC Reports. Communication Division, International Development Research Centre (IDRC), Box 8500, Ottawa, Ontario K1G 3H9, Canada.

A quarterly report on the IDRC's work in making appropriate science and technology available to developing countries. Articles deal with the IDRC's five main areas of concern: agriculture, food and nutrition, health, information sciences, social sciences, and communication.

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Lodha, S.S. (ed.). Directory of Organizations Involved in Rural Development and Appropriate Technology. Centre for Rural Development and Appropriate Technology, Indian Institute of Technology, Hauz Khas, New Delhi 110016, India.

This directory lists voluntary and government, Indian and non-Indian organizations, many of which work in appropriate technology. The organizations working in India are divided by geographic regions. In addition, there is a section covering foreign organizations with no address in India and sections on Indian ministries and industries which may deal with appropriate technology. For each organization the person to contact, address, and a brief description of the organization's activities are given. 92 pp.

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Mackay, Bruce (compiler). Rural Technology in the Commonwealth: A Directory of Organisations. Second Edition. 1980. Food Production and Rural Development Division, Commonwealth Secretariat, Marlborough House, Pall Mall, London SW1Y 5HX, England, UK.

Lists alphabetically by country, 132 organizations involved in rural technology, focusing on those technologies that have actually been adopted by the potential users. For each organization the directory provides the address, information on activities, and a list of publications. 127 pp.

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Network. A.T. International, 1724 Massachusetts Avenue, N.W., Washington, D.C. 20036, USA.

This quarterly newsletter seeks to address issues and concerns raised by individuals and groups working to put the goals of "decentralized development" into practice. Announcements of upcoming events and recent publications are also included.

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Science for Villages. Center for Science for Villages, Magan Sangrahalaya, Warda 442001, Maharashtra, India.

This monthly publication contains articles on a variety of subjects related to appropriate technology. Content includes philosophical treatments of social justice, data on current and projected social needs, excerpts and summaries from conferences and publications, brief descriptions and addresses on relevant technologies developed in India and other parts of the world, as well as a description with plans of a featured technology in each publication.

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TAICH News. Technical Assistance Information Clearing House (TAICH), 200 Park Avenue South, New York, New York 10030, USA.

This newsletter serves to disseminate information on socio-economic programs of US non-governmental organizations in Third World countries. Contains brief articles, reports, book reviews, and news items on a wide variety of topics. Regularly features items on appropriate technology. No. 62, April 1981, and No. 63, July 1981, are of particular interest.

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Tranet. Transnational Network for Appropriate/Alternative Technologies, P.O. Box 567, Rangeley, Maine 04970, USA.

The major portion of this quarterly newsletter consists of news items and brief annotations of new publications on appropriate technology, under the headings AT Concepts, Regional News, Software and Hardward, and AT Notices. Each issue also contains a Special Directory listing organizations and publications on a particular topic. Recent issues have featured "People to People Networks" (No. 20, Fall 1981), "Women and Technology" (No. 21, Winter 1981-1982), and "Water and Sanitation" (No. 22, Spring 1982). Occasionally the newsletter includes an essay on a pertinent topic of concern to TRANET. In one such essay, "The Corruption of Appropriate Technology" (No. 21, Winter 1981-1982, p. 14), Leonard Peries argues that the idea of appropriate technology has been turned into a commodity and divorced from its original concern for indigenous, self-reliant development. He proposes a new movement and a new name, Assimilable Technology.

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World Neighbors In Action. World Neighbors International Headquarters, 5116 North Portland Avenue, Oklahoma City, Oklahoma 73112, USA.

Each issue of this practical newsletter deals with a specific topic related to health and nutrition, family planning, community development, or agriculture and food production. Recent issues featured "Transplanting Clover--A Shared Technology Among Communities in the Peruvian Andes" (Vol. 14, No. 3E), and "Biogas Helps Meet Energy Needs" (Vol. 11, No. 3E). Also available in Spanish.

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VITA News. Volunteers in Technical Assistance, Inc., 1815 N. Lynn Street, Suite 200, Arlington, Virginia 22209, USA.

This illustrated, quarterly newsletter offers an exchange of information and assistance to individuals and institutions in selecting and implementing technologies appropriate to their particular solutions. Contains book reviews, letters, and views.

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Watermark. United Nations Development Programme (UNDP), 1750 New York Avenue, Washington, D.C. 20006, USA.

A newsbrief on water-related activities, which sometimes includes appropriate technology for water.

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Yumi Kirapim. Department of the Prime Minister, Office of Village Development; and South Pacific Appropriate Technology Foundation, P.O. Box 6937, Boroko, Papua New Guinea.

Contains short articles with specific suggestions for villagers on a wide range of topics, from contour planting to types of cookstoves. Issue 19 focuses on women. Language and format are not highly technical and numerous sketches are included. Articles in English, Melanesian Pidgin, and Motu.

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3.2 ORGANIZATIONS

ACTION/Peace Corps, Information Collection and Exchange, 806 Connecticut Avenue, N.W., Washington, D.C. 20525, USA.

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Appropriate Health Resources and Technologies Group, Ltd. (AHRTAG-UK), 85 Marylebone High Street, London W1M 3DE, England, UK.

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A. T. International, 1724 Massachusetts Avenue, N.W., Washington, D.C. 20036, USA.

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Center for Science for Villages, Magan Sangrahalaya, Wardha 442001, Maharashtra, India.

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Coordination in Development, Inc. (CODEL), 79 Madison Avenue, New York, New York 10016, USA.

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Environmental Sanitation Information Center (ENSIC), Asian Institute of Technology (AIT), P.O. Box 2754, Bangkok, Thailand.

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Food and Agriculture Organization of the United Nations (FAO), Via delle Terme di Caracalla, 00100 Rome, Italy.

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Fundacion Para La Educacion Permanente En Colombia (FEPEC). SINENFAL, FEPEC/CEDEN, Apartado Aereo 53372, Bogota, D.E., Colombia.

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Gandhian Insitute of Studies, Appropriate Technology Development Unit, Rajghat Varanasi 221001, India.

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Institut Africain pour le Developpement Economique et Sociale (INADES), INADES-Documentation, 08 B.P. 8, Abidjan 08, Ivory Coast.

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Intermediate Technology Development Group, 9 King Street, London WC2E 8HN, England, UK.

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International Association for the Advancement of Appropriate Technology for Developing Countries, University of Michigan, 603 E. Madison, Ann Arbor, Michigan 48109, USA.

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International Development Research Centre (IDRC), Box 8500, Ottawa, Ontario K1G 3H9, Canada.

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Khadi and Village Industries Commission (KVIC), Irla Road, Vile Parle (West), Bombay 400056, India.

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Liklik Buk Information Center, P.O. Box 1920, Lae, Papua New Guinea.

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Rural Communication Services, 17 St. James Street, South Petherton, Somerset, England, UK.

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South Pacific Appropriate Technology Foundation (SPATF), P.O. Box 6937, Boroko, Papua New Guinea.

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Technical Assistance Information Clearing House (TAICH), 200 Park Avenue South, New York, New York 10030, USA.

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Transnational Network for Appropriate/Alternative Technologies, P.O. Box 567, Rangeley, Maine 04970, USA.

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Village Education Resource Center, G.P.O. Box 421, Dacca, Bangladesh.

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Village Technology Unit, BUTSI (Indonesian Board for Volunteer Service), Tromol Pos 3290, Jakarta, Indonesia.

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Volunteers in Technical Assistance (VITA), 1815 N. Lynn Street, Suite 200, Arlington, Virginia 22209, USA.

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4.0 RECENT ACQUISITIONS

ATIDEX. Box 450, Brighton, East Sussex BN1 8GR, England, UK.

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Bello, Joseph A. and Olukunle Iyanda. Appropriate Technology Choice and Employment Creation by Two Multinational Enterprises in Nigeria. Multinational Enterprises Programme Working Paper No. 17. 1981. International Labour Organization, CH-1211 Geneva 22, Switzerland.

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The Environment Liaison Centre. Directory of NGOs Working on Renewable Energy and Fuelwood Projects in Africa. 1982. The Environment Liaison Centre, P.O. Box 72461, Nairobi, Kenya.

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Farallones Institute Rural Center and CHP International, Inc., with Peace Corps Energy Project/ OPTC. A Training Manual in Appropriate Community Technology: An Integrated Approach for Training Development Facilitators. 1982. The Farallones Institute Rural Center, 15290 Coleman Valley Road, Occidental, California 95465, USA; or CHP International, Inc., 1010 West Lake Street, Oak Park, Illinois 60301, USA.

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Feachem, Richard G., David J. Bradley, Hamda Garelick, and D. Duncan Mara. Appropriate Technology for Water Supply and Sanitation: Health Aspects of Excreta and Sullage Management--A State-of-the-Art Review. 1981. Transportation, Water, and Telecommunications Department, The World Bank, 1818 H Street, Washington, D.C. 20433, USA.

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Foubert, Charles-Henri. The IDOC Documentation Handbook: A Guide to Appropriate Technology and Information Systems. 1982. International Documentation Centre, IDOC International, Via Santa Maria dell'Anima 30, 00186, Rome, Italy.

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Fricke, Thomas B. Bamboo-Reinforced Concrete Rainwater Collection Tanks: A Project of Community-Based Appropriate Technology and Development Services in Thailand. Working Paper. 1982. A. T. International, 1724 Massachusetts Avenue, N.W., Washington. D.C. 20036, USA.

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Hoover, Paul and Laurie Richards. Technology Choice, Adaptation, and Adoption: An Analysis of Three Case Studies. Working Paper. 1982. A. T. International, 1724 Massachusetts Avenue, N.W., Washington, D.C. 20036, USA.

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Kamweti, David. Tree Planting in Africa South of the Sahara. 1982. The Environment Liaison Centre, P.O. Box 72461, Nairobi, Kenya.

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Myers, Barbara. A Commercial Use for Taro: A Project of the Instituto Matia Mulumba in Colombia. Working Paper. 1982. A. T. International, 1724 Massachusetts Avenue, N.W., Washington, D.C. 20036, USA.

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Navarro College, with Texas Education Agency. Alcohol Fuel Production for Vocational Students: Secondary, Postsecondary, Adult/Continuing Education. 1981. Navarro College, Corsicana, Texas; or Research Coordinating Unit, Department of Occupational Education and Technology, Texas Education Agency, Austin, Texas 78701, USA.

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Navarro College, with Texas Education Agency. Energy Conservation for Vocational Students: Postsecondary, Adult/Continuing Education. 1981. Navarro College, Corsicana, Texas; or Texas Education Agency, Austin, Texas 78701, USA.

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Rybczynski, Witold, Chongrak Polprasert, and Michael McGarry. Appropriate Technology for Water Supply and Sanitation: Low-Cost Technology Options for Sanitation, A State-of-the-Art Review and Annotated Bibliography. 1982. Health Science Division, International Development Research Centre (IDRC), Box 8500, Ottawa, Ontario K1G 3H9, Canada; or Transportation and Water Department, World Bank, 1818 H Street, Washington, D.C. 20433, USA.

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Tinker, Irene. Energy Needs of Poor Households. Women in International Development Working Paper No. 4. 1982. Women in International Development, 202 International Center, Michigan State University, East Lansing, Michigan 48824, USA.

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UNICEF. Appropriate Technology: A Service of the World Scout Bureau. n.d. World Scout Bureau, C.P. 78, 1211 Geneva 4, Switzerland.

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NON-FORMAL EDUCATION INFORMATION CENTER

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